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Eleventh day of April 2000

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AUSTRALIA

Patents Act 1990

CABCAPE HOLDINGS
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PROVISIONAL SPECIFICATION

Invention Title:

Access panel

The invention is described in the following statement:

Field of the Invention

This invention relates to an access panel for an outlet for cable services through a barrier such as a floor, wall, ceiling, desktop or the like.

Background of the Invention

Modern offices house an extensive array of electronic and electrical equipment which require both power supply and interconnecting communications cabling. As a result, such buildings commonly incorporate a hollow raised floor which provides cavities/ducts along which the cabling travels. The transition of power, phone lines, data cables and the like from the sub floor cavities/ducts is achieved through recessed compartments commonly known as floor boxes. An example can be seen in PCT/GB92/011011 (AU 19759/92). Floor boxes generally incorporate a frame which extends around an aperture in the barrier. For floors the frame is typically clamped between the floor surface and the underside of the floor deck which may be made of particle board, metal,cementitious materials or a combination thereof. The floor box includes a lid for closing the panel and is adapted to support a service outlet box mounted under the lid. The outlet box will provide an array of sockets connected to the various cable networks. Equipment above the floor is connected via cable leads which pass through a latch in the lid, which is able to be rotated to either an open position or a closed position. However, such existing devices suffer from a number of substantial deficiencies.

First, conventional recessed floor boxes have a substantial edge surround or carpet frame which overlies the floor finish and usually projects above the floor surface. Common surface finishes in office include loose laid carpet or vinyl tiles, carpet or vinyl sheet and melamine laminate sheet. As used herein the term floor surface or floor surface covering means the upper part of the floor covering, for example, the upper surface of a vinyl tile or the top of the pile of a carpet. Thus, the edge surrounds of conventional recessed

floor boxes form a ridge in the floor which is both unsightly and a safety hazard and may for example, cause office workers to trip, or upset trolleys.

Conventional carpet frames are generally made from injection moulded plastic and consequently are not particularly strong. The floor boxes do not meet the building standards set for supporting loads which the floor has to meet. Floor boxes are generally exempted from having to meet those standards because they are not, in theory, subject to the same forces as a floor is typically subjected to particularly point or static loads. However, they may be subjected to rolling loads and it would be advantageous to provide an access panel which was substantially as strong as the floor in which it was located.

A further problem with existing floor boxes occurs in the event of a fire. As discussed, the boxes are made of plastic material and support a relatively heavy outlet box. With the heat caused by fire, there is a tendency for the frame to soften and weaken and the outlet box will fall. This creates an aperture in the floor and the ducts act as chimneys and allow flames into the office space and draw air into the office space fuelling the fire. Thus, the performance of conventional recessed floor boxes, under fire conditions is unsatisfactory.

A further problem with conventional floor boxes is that the lid is unsafe because the lids are not locked down and can be accidentally lifted, for example by pulling the cables. This allows the cables to slip away from the latch opening and under the lid itself, where they are subject to shearing between the lid and the edge of the frame. This not only damages the cables but can be dangerous to staff particularly if the cables are electrical supply cables. A further hazard which can occur if the lid is dislodged, is that the box can trip people. Floor boxes are often inactive which case they often contain coiled cables. Those coiled cables can expand and push against the lid opening the lid. It is thus desirable that the lid should be latchable when it is both opened and closed.

Summary of the Invention

In a first aspect of the present invention there is provided a floor having a floor covering and an opening in the floor, an access panel for access to cables, services or the like through the opening, the access panel including a floor frame located in the opening, a lid supported on the frame, the frame having a support flange extending around its periphery wherein the support flange extends between the floor covering and the floor deck.

By placing the support flange of the frame between the floor and the floor covering, the flange is hidden by the floor which not only means the appearance of the flange becomes unimportant but also improves safety.

It is preferred that the flange provides a ramped edge thus providing a substantially continuous smooth surface. Unlike conventional floor boxes, the frame does not have to fit over compressed carpet. Thus, it is possible to provide a ramped edge which is relatively thin and flexible, which will fit satisfactorily beneath a floor covering.

Thus in a second aspect of the present invention, there is provided a frame for an access panel comprising a rigid structural element for supporting an outlet box or the like, the frame including a tapered outer edge or flange wherein the flange tapers substantially uniformly over a distance of at least 10, and preferably, 20 times the maximum thickness of the flange.

In a third aspect of the present invention, there is provided a frame for an access panel comprising:-

a rigid structural frame, defining an outer edge; and

a tapered flange formed from a soft non structural material, typically a flexible polymeric material, attached to and overlying the outer edge.

The structural part of the frame may be formed from a rigid high strength material most preferably a die cast metal such as zinc or aluminium.

Because the frame edge may fit under the floor covering, the appearance of the frame is unimportant as it is largely hidden. Consequently it is possible to make the frame from metal. This makes the frame and access panel stronger and improves fire resistance.

Rubber modified polypropylene and polyurethane are 2 materials which may be used to form the overmoulding.

A fourth aspect of the present invention provides a floor having a floor covering, a floor frame for an access panel having a support flange extending around the periphery of the frame and a lid supported on the frame wherein the highest part of the frame and lid are below the floor covering surface.

In a preferred embodiment, the frame defines an upstanding rib which extends around a central aperture of the frame, which aperture is closable by a lid, the rib being disposed between the peripheral edge of the flange and the central aperture, and wherein the upstanding rib is lower than the load bearing surface of the floor.

The load bearing surface is the surface down to which the pile of the carpet of the file may crush under normal usage loads. In use, the floor covering will abut the rib to ensure a close fit of the floor covering around the access panel.

Having all the components of the access panel below the load bearing surface of the floor enables the provision of a smooth floor surface which is both safer and more aesthetically pleasing than is possible with conventional floor boxes.

In a fifth aspect, the present invention provides an access panel for insertion into an aperture in a floor as described in any of the first four aspects of the invention wherein the materials and construction of the frame and lid are such that the load bearing capacity of the frame and lid is substantially the same as that of the surrounding floor.

The lid may comprise a rigid strong panel having a flexible overmoulding. The rigid panel may be a steel plate, a die casting or an injection moulded polymer. The flexible overmoulding may be polyurethane or a rubber modified polypropylene.

The frame is typically rectangular, most typically square and may define a pivot surface extending parallel to and spaced inwardly from an inner edge of the frame which abuts the floor deck and defines the aperture. The underside of the lid may define a bearing surface which is adapted to slidably engage on the pivot surface to allow the lid to bear on and pivot about the pivot surface.

In a sixth aspect of the present invention, there is provided a lid for an access panel for insertion into an aperture in a floor, wall or desktop or the like for cable services in communication with an opening through the barrier, the lid including a hatch pivotally connected to the lid, and moveable between an open position in which there is an aperture in the lid through which cable surfaces may extend and a closed position in which there is no aperture, the lid being characterised in that locking means are provided on the lid to lock the hatch in place in both the open and closed positions.

In a seventh aspect, the present invention provides a lid for an outlet for cable services through a barrier such as a floor, wall or the like, adapted to be seated on or closely adjacent a surface of the barrier and in communication with an opening therethrough, the lid including a hatch pivotally connected to the lid and moveable between an open position in which there is an aperture in the lid through which cable services may extend and a closed position in which there is no such aperture characterised in that when the lid is latched and the hatch is open, neither the lid or the hatch can be raised from a predetermined position by movement of cable.

An eighth aspect of the present invention, there is provided a lid for an outlet for cable services through a barrier and adapted to be seated on, a frame disposed around an aperture in the barrier, the lid including a hatch pivotally connected to the lid and moveable between an open position in which there is an aperture in the lid through which cable services may extend and a closed position in which there is no such aperture, the lid being characterised in that the lid and hatch are joined together by an integral hinge.

The lid may be formed in part from a rigid structural material and in part from a resilient flexible material.

Thus, in a ninth aspect of the present invention, there is provided a lid for an outlet for cable services through a barrier such as a floor, wall or the like, adapted to be seated on or closely adjacent a surface of the barrier and in communication with a hole therethrough, the lid comprising a rigid panel formed from a structural material, such as metal or engineering grade polymer and an overmoulding formed from a flexible polymeric material, the overmoulding defining at least one hatch.

The tenth aspect of the present invention provides an access panel for accessing cable services through a barrier such as a floor, wall or the like, the access panel having a frame and a lid and wherein the frame defines the first and second bearing surfaces being shaped and configured such that a first bearing surface for a hinge supported away from a wall of the frame and wherein the lid defines a second bearing or hinge surface whose ends define detents, the first and second bearing surfaces being shaped and configured such that in use the second bearing surface is arranged to bear on the first bearing surface to form an open hinge element, relative movement of the hinge surface about the bearing surface allowing the lid to rotate, characterised in that when the lid is closed, the detents engage underneath the means providing the bearing surface and prevent the one end of the lid

adjacent the bearing surfaces from being raised relative to the bearing surface.

In a preferred embodiment, a similar second bearing surface is defined at an opposite end of the frame and a latch on the lid is engageable underneath the second bearing surface. The latch which holds the lid closed, preferably includes one or more C-shaped projections which engage underneath the second bearing surface, the geometry of the arrangement being such that pressure on the underside of the lid tends to force the latch to close more tightly.

The way the lid is secured by the latch is important as it provides the access panel with a solid feel should it be walked on. Ideally, it should feel as solid as the surrounding floor.

It is preferred that the bearing elements are symmetrically arranged such that the lid can be turned around by 180° with either bearing element acting as the fulcrum for the hinge.

In a particularly preferred embodiment, two further hinge elements are provided so that the lid can be turned around through 90° and still function.

An access panel embodying various aspects of the present invention has substantial benefits in preventing water from entering the access panel when the lid is closed. First, the tapering flange extending around the outside, provides a type of ramp or dam which acts as a first line of defence against ingress of water through the panel.

Secondly, the upstanding rib extending around the frame, in co-operation with the rib around the periphery of lid, also inhibits ingress or water through the lid. The rib typically formed from the flexible overmoulding. It is preferred that the rib is angled towards the centre of the frame. The edges of the lid are also formed from a flexible material are also angled so that a chamfered sealing fit is formed when the lid is closed on the frame with the rib bent outwardly.

In a particularly preferred embodiment, third line of defence is a closed channel is formed extending along and around one or more inner edges of the frame which is adapted to trap water which passed between the lid and the upstanding ribs.

Thus in an eleventh aspect of the present invention, there is provided an access panel for insertion into an aperture in a floor, wall or the like, wherein the frame defines an aperture around which an upstanding rib extends, wherein the edges of the rib are chamfered and wherein the edges of the lid for the access panel are formed from a flexible material and are also chamfered to provide a substantially waterproof sealing fit between the lid and the upstanding rib.

In an twelfth aspect of the present invention, there is provided an access panel for insertion into an aperture in a floor, desktop or the like, the access panel including a floor frame defining an aperture and wherein a closed well or trough is defined extending along at least one side of the aperture, preferably on two sides and most preferably on all four sides of the aperture.

One problem with cables, particularly modern data transmission cables, is that they are easily damaged by kinking or bending the cables through too tight a radius.

In a thirteenth aspect of the present invention there is provided an access panel for cables, services or the like comprising:

a frame;

a lid adapted to close the frame;

the lid including a latch pivotally connected to the lid, a hatch movable between an open position in which there is an aperture in the lid for which cable services may extend and a closed position in which there is no aperture, the lid being characterised in that the latch is supported in the open position between two or more pillars which have curved inner faces so as to

define an expanding trumpet-shaped aperture for cables extending through the hatch and outside of the panel.

By defining a smoothly curved trumpet shaped opening, a large bend radius of the cables is ensured. Also there are no sharp edges which might kink or damage cables.

It is preferred that the sides of the lid of the lid are tapered inwards to facilitate closure against the carpet frame and also to sweep aside the carpet frame.Typically the edge of the lid has a slope of 30 to 45 degrees.

Brief Description of the Drawings

A specific embodiment of the invention will now be described, by way of example only, and with reference to the accompanying drawings in which:

Figure 1 is a perspective view from above of an access panel and lid components embodying the present invention for above;

Figure 2 is a perspective view of the components shown in Figure 1 viewed from below;

Figure 2a is a cross section through one of the components being a latch;

Figure 3 is a side view of the components shown in Figure 2;

Figure 4 illustrates a section through a lid for the access panel shown in Figure 1;

Figure 5 shows a section through a frame for the access panel shown in Figure 1; and

Figure 6 illustrates the lid located in position on the frame with a hatch in an open position.

Detailed Description of a Preferred Embodiment

Referring to Figure 1, the access panel comprises two sub-assemblies or components, a support frame 10 and a lid 100. Turning to consider the support frame 10 first, as is best seen in Figures 2 and 3, the support frame

comprises a structural element or frame 12 and a flexible overmoulding 14. The frame is generally square. The structural element is manufactured from a rigid high strength material such an engineering grade polymer (for example glass filled polypropylene or nylon, or more preferably die cast metal such as aluminium or zinc.

The structural element 12 of the frame includes a square frame element 16 which is adapted to locate inside an aperture in a floor, wall, desk or the like and an integral load bearing flange 18 which extends away from the outer edge of the frame element 16. This flange sits on the floor deck in use and supports the frame element. The load bearing flange 18 may be either screwed or glued to the floor deck. Fastening with screws facilitates removal and reuse of the box but is more time consuming than simply gluing the flange to the floor deck.

Turning back to Figure 1, channels 22 run along the inner edges of the frame element 18. As is best seen in Figure 3, the lip of the channel 24 provides a bulbous upper edge which projects inwardly from the channel 22.

The overmoulding 12 is manufactured from a flexible polymeric material such as epdm or polyurethane. The upper edge of the overmoulding 18 defines an upstanding rib 20 which projects above the flange 10. The outer edge of the overmoulding defines a flange 26 which is tapered and forms a ramp which is typically at an angle of 1 in 10 to 1 in 20. This allows the floor finish such as a carpet, carpet tile or the like, to extend over the flange and abut the upstanding rib 20 extending around the central aperture of the frame. The upstanding rib 20 acts an edge trim to the floor finish. A typical floor finish is modular carpet tile, and the rib is sized to correspond with the thickness of the bonding layer at the base of the carpet pile. Figure 3 illustrates the frame 10 located in an aperture in a raised floor deck with carpet 23 extending over the flange 26 and abutting the upstanding rib 20

The overmoulding may be moulded separately to the structural frame and then attached. Alternatively, it may be moulded directly onto the frame. To ensure that the overmoulding is firmly attached to the structural frame, buttons 28 are provided on the underside of the overmoulding which engage in corresponding sockets 30 defined in the structural frame.

The lid 100 has three elements. The lid panel itself 102, access hatches 104 and 106, and a latch 108. With reference to Figure 4 in particular, the lid has a structural core 110 and a flexible overmoulding 112. The core comprises a rigid plate manufactured from metal or engineering grade polymer although the preferred material is steel plate because its strength allows for the core to be relatively shallow, thus providing maximum clearance for plugs and cable terminals inside the box cavity, yet providing a strength which is comparable to the surrounding floor. However, engineering grade polymers have the advantage of being mouldable to more exacting tolerances than steel and would simplify overmoulding of the outer sheath 12 of the lid 100.

With reference to Figure 1, the main central area of the lid is formed from the steel plate as is an integral tongue 114 whilst the hatches 104 and 106 are formed from the flexible overmoulded material. The tongue may, however, be formed from the flexible overmoulded material. This allows the hatches 104, 106 to be linked with the lid 102 by flexible hinges formed from the flexible material.

Around the outer edge of the lid and hatches, there is an upstanding ridge 116 which defines a square perimeter which has a small cut-out where the tongue is formed and which is adapted to receive a piece of carpet tile or the like for matching the appearance of the lid to the surrounding floor covering. As is best seen in Figure 4, below the ridge, the outer edge 118 of the lid is chamfered which assist in forming a good seal with the upstanding rib 20 of the overmoulding when the lid is used to close the aperture in the frame of the access panel 10.

The angle of the chamfered edge is about 30 to 40°. The chamfer also has the function of sweeping aside carpet pile so that the carpet pile is not sheared by the edge of the lid when the lid is closed.

As is best seen in Figure 3, the underside of the lid defines one or more ledges 120 extending away from opposite side of the lid to the hatches. The upper part of the ledge and the lower part of the lid define a curved generally J shaped bearing surface bearing or socket 120. In use, when the lid is placed on the frame, the socket engages over the lip 24 of the channel and this forms an open hinge which allows the lid to rotate about the lip 24 which acts as a fulcrum to either open or close the access panel. Further, as the detent engages under the bulbous lip 24, pressure on the underside of the lid does not cause the detent to be raised relative to the lip, as the lip acts as a barrier.

The hatches are integrally trapped with the lid sheath and are thus formed from a flexible material and consequently have to have thick cross sections to provide sufficient stiffness. The thick cross sections also allow large bend radii which inhibits kinking of the cables.

As discussed above, the hatches are joined to the lid body by relatively thin webs which act as integral hinges. In the areas where there is an upstanding ridge 116, V shaped cut-out portions are provided in the ridge to allow the hatch to rotate relative to the lid body 102. The hinge webs are relatively long to ensure that the hatch will cooperate, bend when the lid is covered with a floor surface material, not shown, which is glued onto the lid inside the perimeter defined by the ridge 116.

Turning to Figure 2, each hatch has two supporting pillars 122 depending from the underside of the hatch, which support the hatch in an open position when required. As can be seen, each pillar has two concave support slots, an upper slot 124 adjacent the base of the hatch surface and a lower slot 126 close to the lower end of the depending pillar. The upper set of slots are adapted to hold the hatches in a closed position. The lower set of slots hold the hatches in an open position. If it is desired to provide more

than one opening aperture, for example to allow for a larger than normal cable, another set of slots may be provided on the pillar for each desired angle of opening.

Each pillar has an outwardly curving inner face such that the gap between the two pillars supporting a hatch increases from the hinge joining the hatch to the lid outwardly to define a trumpet shaped opening which prevents kinking and overtight bends in the cables when fed through the hatch.

The hatch is mounted on a tongue which extends away from structural core 110 of the lid and is integral therewith. On the free end of the tongue a cylindrical hinge shaft 128 is defined. A latch 130 is mounted on that shaft. The latch comprises a lever which has a generally C-shaped hinge barrel 130 on one end and two downwardly projecting flanges 134 each having a concave mouth 136 which is adapted to engage on the bulbous lip 24 of the channel when the latch is closed. The hinge barrel 128 is retained on the shaft by a snap in retaining clip 136 which has a depending button 138 on its underside which projects through a hole 140 in the latch and the button engages against the shaft preventing the latch from dislodging from the shaft. The geometry of the arrangement is such that the when the lid is closed with the latch locked upward forces on the trap door tend to force the latch into a tighter closure.

In an alternative construction, not shown, the latch may be formed integrally with the trap door over moulding as a projection off the end of the tongue. In this configuration the latch has a single central projecting flange that passes through a slot in the tongue. Again the flange has a concave mouth which engages around the channel bulb 34. The latch has projections that prevent the latch from rotating out of the slot in the tongue. These can be formed as elements on the flange, or as a secondary flange on each side of the latch lever or as a projection off a retaining clip. In this configuration the

retaining clip is similar to the clip 136 described above but serves to stiffen the lever to offset the flexibility of the moulding material.

The retaining clip may be embossed or otherwise treated to display a brand name or label such as "pull to open". In many applications it is desirable to have a floor box dedicated to one particular cable service, for example for power. In this configuration rather than a square access panel, the access panel will be relatively long and narrow and the lid will typically have only one hatch. Which is located on one side of the lid.

In another alternative embodiment the service sockets are not mounted in the box but may be mounted in the underside of the lid so that when the trap door is opened the sockets are rotated above the floor where they are more easily accessible. In this embodiment the lid will be fitted with a flexible conduit to protect the incoming cables.

It will be appreciated by persons skilled in the art that numerous variations and/or modifications may be made to the invention as shown in the specific embodiments without departing from the spirit or scope of the invention as broadly described. The present embodiments are, therefore, to be considered in all respects as illustrative and not restrictive.

Dated this thirty-first day of March 1999

Cabscape Holdings
~~CROSSTRACK~~ PTY LTD

Patent Attorneys for the Applicant:

F B RICE & CO

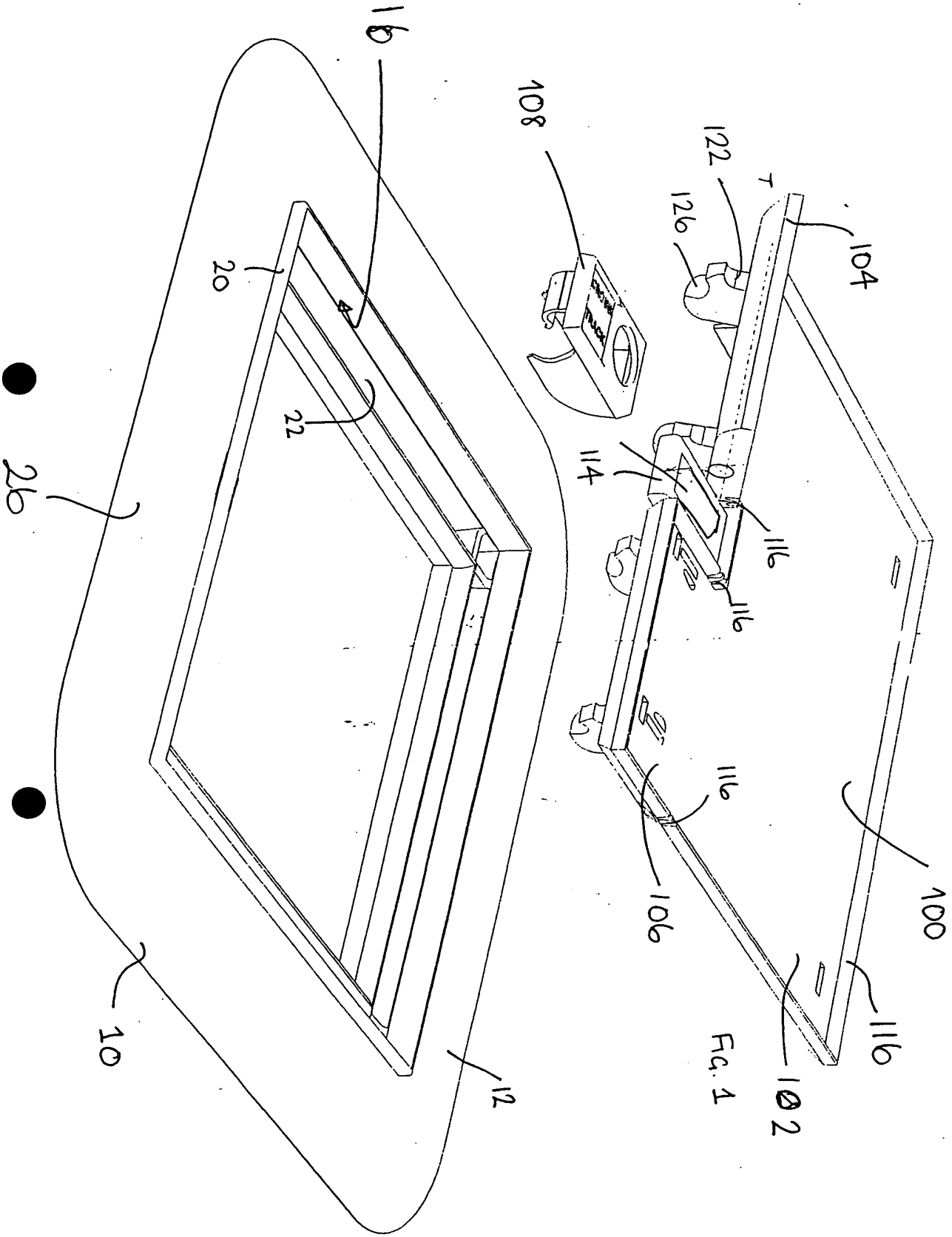

Fig. 1

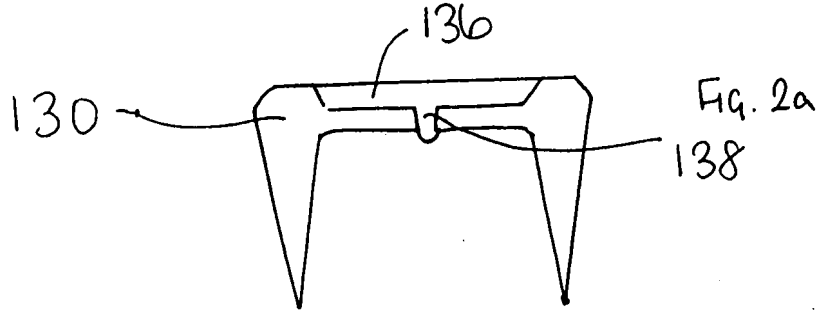
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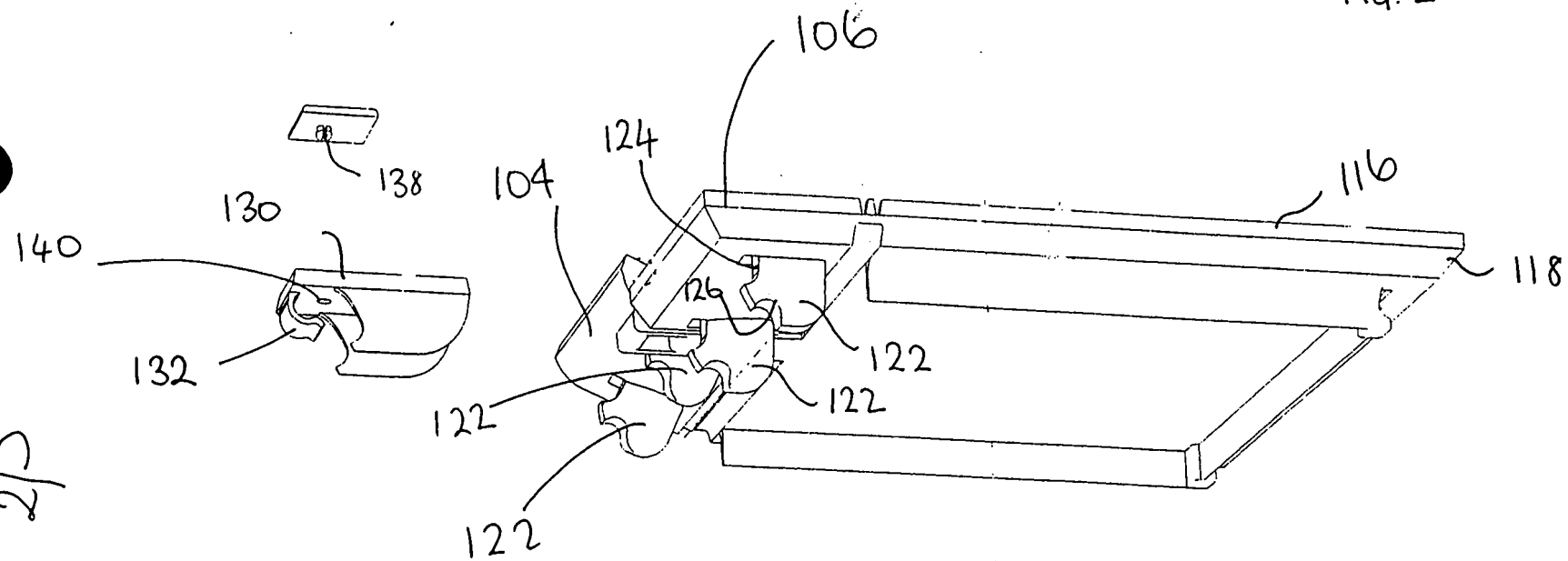
Fig. 2a

Fig. 2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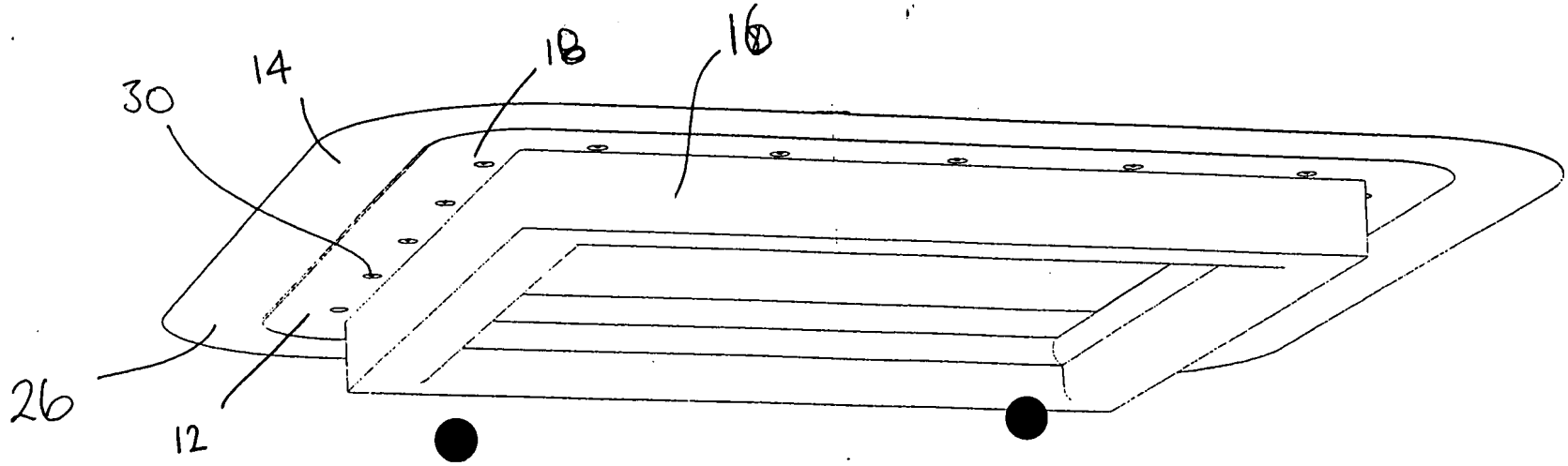
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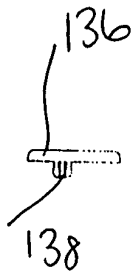
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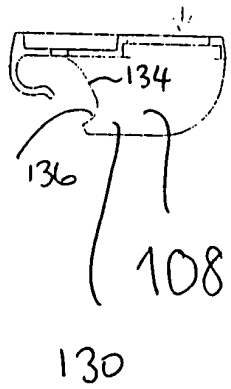
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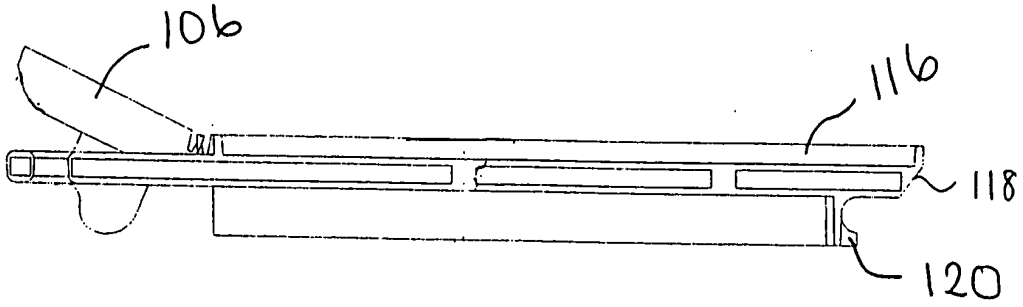
FIG. 3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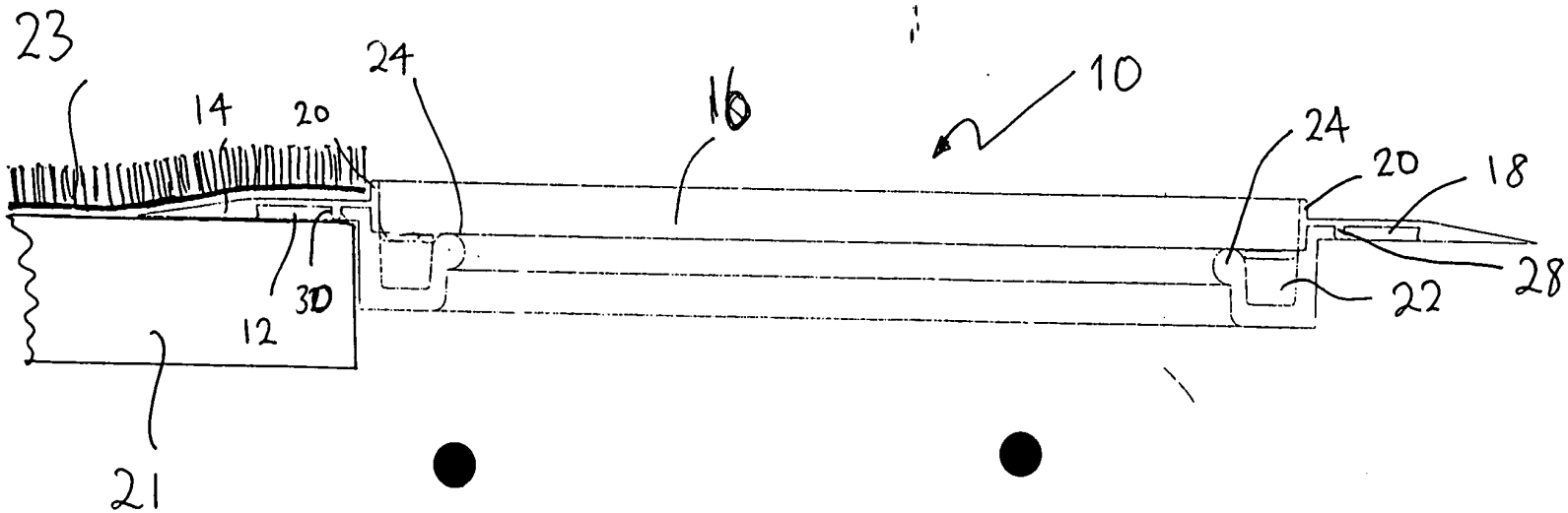
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Fig. 4

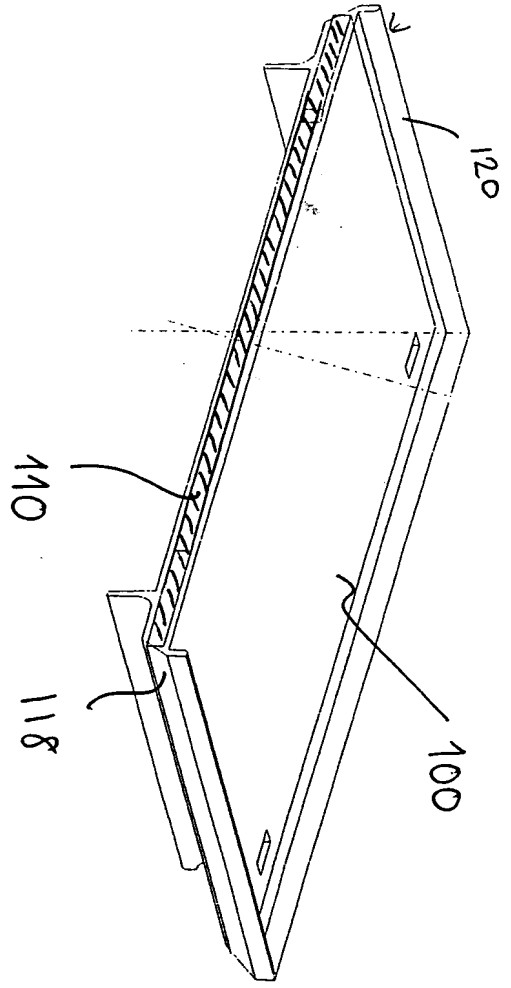
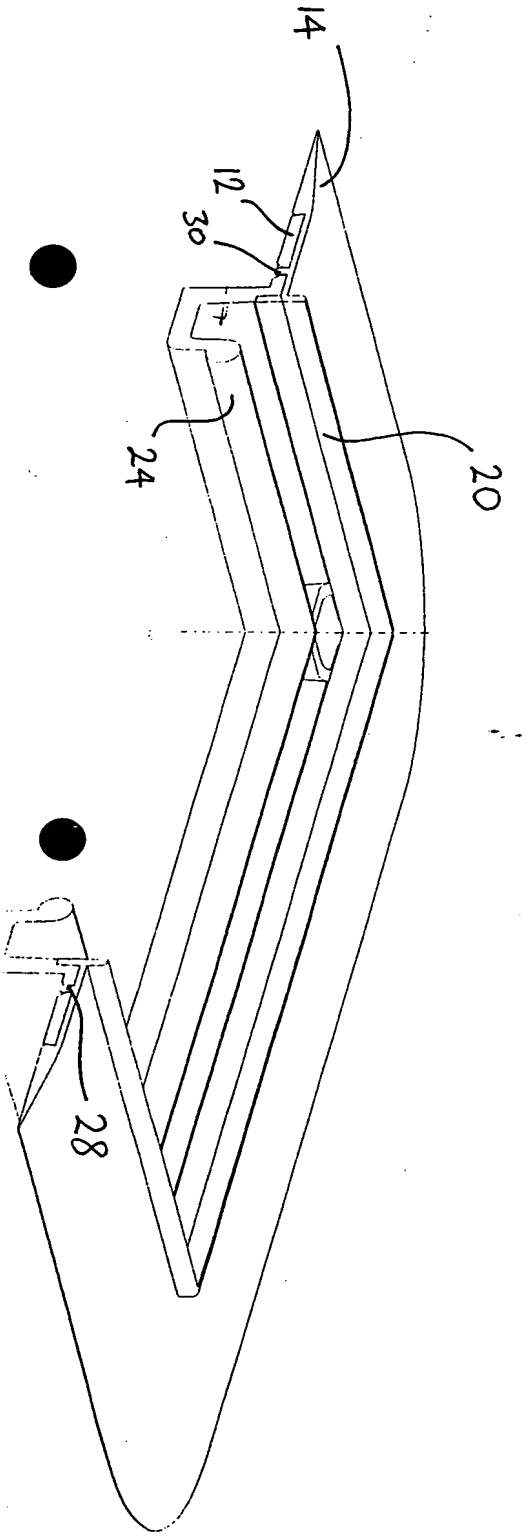


Fig. 5



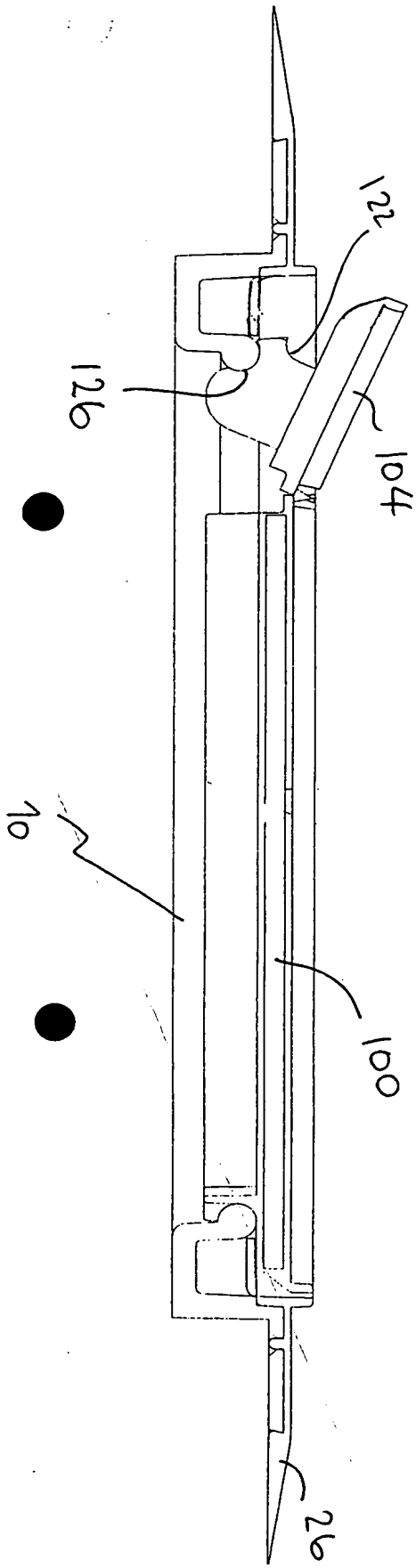


Fig. 6